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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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10/773,776

02/06/2004

Sang-Soo Kim

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7884

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MACPHERSON KWOK CHEN & HEID LLP

2033 GATEWAY PLACE

SUITE 400

SAN JOSE, CA 95110

EXAMINER

MOON, SEOKYUN

ART UNIT

PAPER NUMBER

2629

MAIL DATE

DELIVERY MODE

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PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary

Application No.

10/773,776

Applicant(s)

KIM ET AL.

Examiner

Seokyun Moon

Art Unit

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 06 August 2007.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1,2,4-13 and 15-21 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☐ Claim(s) _____ is/are rejected.
- 7) ☒ Claim(s) 5 and 16 is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 06 February 2004 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Priority

1. Receipt is acknowledged of papers submitted under 35 U.S.C. 119(a)-(d), which papers have been placed of record in the file.

Response to Amendments

2. Claim 4 was objected to for minor informalities.

The claim has been amended.

The objection has been withdrawn.

Response to Arguments

3. The Applicants' arguments with respect to the rejections of claims 12-21 under 35 U.S.C. 112 first paragraph have been fully considered and are persuasive. Therefore, the rejection has been withdrawn.

4. The Applicants' arguments with respect to the rejections of claims 3 and 14 have been considered but are moot in view of the new ground(s) of rejection.

Claim Objections

5. **Claims 4 and 15** are objected to because of the following informalities:

Claims 4 and 15 depend on claims 3 and 14 that are canceled in the amendment.

Appropriate correction is required.

Claim Rejections - 35 USC § 103

6. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

7. **Claims 1, 2, 4, 6, 8-15, 17, and 19-21** are rejected under 35 U.S.C. 103(a) as being unpatentable over Park (US 2002/0015028) in view of Kudo et al. (US 2006/0033695).

As to **claim 1**, Park teaches an apparatus [fig. 1] for driving a liquid crystal display [par. (0026) lines 1-3], the apparatus comprising:

a signal controller ("*controller 20*") [fig. 1] for generating digital signals for different pixel colors [par. (0034) lines 2-5];

a gray voltage generator (a combination of "*memory 32*", "*decoder 33*", and "*D/A converter 34*" included in a plurality of "*column driver IC 14*") [figs. 1 and 3] coupled to the signal controller [fig. 2], wherein the gray voltage generator generates gray voltage signals [par. (0038) lines 3-6], the gray voltage generator including a first gamma voltage register (one of the registers implemented in the "*memory 32*") [fig. 3], wherein the first gamma voltage register stores digital gamma voltages received from the signal controller [par. (0038) lines 1-2]; and

a data driver (a combination of "*shift register 24*", "*data latch 26*", "*d/a converter 28*", and "*buffer 30*" included in a plurality of "*column driver IC 14*") [figs. 1 and 3] coupled to the gray voltage generator and the signal controller, wherein the data driver converts each one of the digital signals to a corresponding analog signal by selecting one of the gray voltage signals [par. (0037), emphasis on lines 7-13].

Park does not teach the gray voltage generator generating gray voltage signals that are specific to the different pixel colors and the data driver converting each one of the digital signals to an analog signal by selecting one of the gray voltage signals that is associated with the same pixel color as the digital signal that is being converted.

However, Kudo teaches an apparatus for driving a liquid crystal display [par. (0002)] comprising a signal controller (a combination of “MPU 906”, “system interface 907”, and “control register 301”) [fig. 16] generating digital signals, gray scale voltage generator (“302”) coupled to the signal controller generating gray voltage signals that are specific to the different pixel colors [par. (0107) lines 1-4 and par. (0108) lines 6-10], and a data driver (“decoder circuit 303”) [figs. 3 or 9] selecting one of the gray voltage signals that is associated with the same pixel color as the digital signal [par. (0047) lines 6-8].

It would have been obvious to one of ordinary skill in the art at the time of the invention to apply the idea of Kudo, i.e. providing different digital gamma values for different pixel colors and generating different gray scale voltages based on the different digital gamma values, to the apparatus of Park, by modifying the signal controller of Park to include a plurality of registers, wherein each of the plurality of registers stores digital gamma values for each of a plurality of pixel colors, modifying the gray voltage generator of Park to generate gray voltage signals that are specific to each of the plurality of pixel colors by including additional memory, decoder, and D/A converter that are specific to each of the plurality of pixel colors, and modifying the data driver of Park to select one of the gray voltage signals which is associated with the same pixel color as the digital signal outputted from the signal controller, in order to allow the gray voltage generator of Park to output gray voltages representing more accurate gamma curves to the liquid crystal panel of the display of Park, and thus to improve the image quality of the display.

Park as modified by Kudo teaches a first color-specific gamma voltage register storing digital gamma voltages received from the signal controller for a specific pixel color, as discussed above.

Park as modified by Kudo does not teach a second color-specific gamma voltage register coupled to the first gamma voltage register, which stores digital gamma voltages received from the signal controller for a specified pixel color.

However, since the Applicants have failed to disclose having two color-specific gamma voltage registers instead of one color-specific gamma voltage register provides an advantage, is used for a particular purpose, or solves a state problem, it is an obvious matter of design choice to include two color-specific gamma voltage registers.

Furthermore, the courts have held that separating a single part (the color-specific gamma voltage register of Park as modified by Kudo) into a plurality of separated parts (the first and the second color-specific gamma voltage register) is generally recognized as being within the level of ordinary skill in the art. *In re Dulberg*, 289 F.2d 522, 523, 129 USPQ 348, 349 (CCPA 1961).

Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to use one or two of color-specific gamma voltage registers in order to store digital gamma voltages received from the signal controller since either one or two of color-specific gamma voltage registers would perform equally well at storing digital gamma voltages temporarily.

As to **claim 2**, Park as modified above teaches the gray voltage generator (Park: a combination of “*memory 32*”, “*decoder 33*”, and “*D/A converter 34*” included in a plurality of “*column driver IC 14*”) [Park: figs. 1 and 3] separately storing gray voltages for each of the pixel colors [Park: par. (0038) lines 1-2] (Note that the apparatus of park as modified above includes “*memory 32*” for each of the pixel colors).

Park as modified above does not teach the gray voltage generator separately storing gray voltages for each voltage polarity.

However, Kudo [fig. 13] further teaches a gray voltage generator generating gray voltage signals that are specific to different voltage polarities.

It would have been obvious to one of ordinary skill in the art at the time of the invention to modify the signal controller of Park as modified above to include registers storing digital gamma values for each of different voltage polarities and to modify the gray voltage generator of Park as modified above to generate gray voltage signals that are specific to different voltage polarities by including additional memory, decoder, and D/A converter for each of the different voltage polarities such that the gray voltage generator of Park as modified above separately stores gray voltages for each voltage polarity, as taught by Kudo, in order to output gray voltages representing more accurate gamma curves to the liquid crystal panel of the display of Park as modified above, and thus to improve the image quality of the display.

As to **claim 4**, Park as modified above teaches the gray voltage generator further comprising a digital-to-analog converter (Park: “34”) [Park: fig. 3] for converting the digital gamma voltages that are stored in the first and the second color-specific gamma voltage registers into analog gray voltages [Park: par. (0038) lines 3-6].

As to **claim 6**, Park as modified above teaches that the data driver (Park: a combination of “*shift register 24*”, “*data latch 26*”, “*d/a converter 28*”, and “*buffer 30*” included in a plurality of “*column driver IC 14*”) [Park: figs. 1 and 3] comprises a plurality of data driving circuits for receiving image data (Park: “*R,G,B data*”) and data control signals (Park: “*column control signal*”) from the signal controller (Park: “*controller 20*”) [Park: fig. 1] [Park: par. (0037)], wherein each of the data driving circuits (Park: a combination of “*shift register 24*”, “*data latch 26*”, “*d/a converter 28*”, and “*buffer 30*”) [Park: fig. 3] includes a sampling unit (Park: a combination of “*D/A converter 28*” and “*buffer 30*”) for sampling gamma voltage data from the digital-to-analog converter (Park: “*D/A converter 34*”).

As to **claim 8**, Park as modified above teaches the image data being transmitted from the signal controller (Park: “*controller 20*”) [Park: fig. 1] to the data driving circuits (Park: a combination of “*shift register 24*”, “*data latch 26*”, “*d/a converter 28*”, and “*buffer 30*” included in each of a plurality of

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"column driver IC 14") [Park: figs. 1 and 3] by two signal lines [fig. 3] that are separately connected between the data driving circuits and the signal controller.

As to **claim 9**, Park as modified above teaches the gray voltage generator (Park: a combination of "memory 32", "decoder 33", and "D/A converter 34" included in a plurality of "column driver IC 14") [Park: figs. 1 and 3] being coupled to the data driver (Park: a combination of "shift register 24", "data latch 26", "d/a converter 28", and "buffer 30" included in a plurality of "column driver IC 14") [Park: figs. 1 and 3] by a plurality of buses [fig. 3].

As to **claim 10**, Park as modified above teaches that the signal controller comprises a register (Kudo: "controller register 301") [Kudo: fig. 16] for storing a predetermined number of digital gamma data, wherein the digital gamma data are supplied to the gray voltage generator for generating independent gamma curves for the different pixel colors [Kudo: par. (0107) lines 1-4 and par. (0108) lines 6-10].

As to **claim 11**, Park as modified above teaches a gate driver (Park: a combination of "scan driver IC 12") [Park: fig. 1] coupled to the signal controller (Park: "controller 20"), wherein the gate driver generates gate control signals in response to signals from the signal controller [Park: par. (0028) lines 7-9 and par. (0030) lines 8-9].

As to **claim 12**, Park teaches a liquid crystal panel assembly [par. (0026) lines 1-3] comprising:
a plurality of pixel electrodes (any liquid crystal display includes a plurality of pixel electrodes)
wherein each of the pixel electrodes is associated with a pixel color (R, G, or B);
a liquid crystal layer [par. (0002)];
a data driver (a combination of "shift register 24", "data latch 26", "d/a converter 28", and "buffer 30" included in a plurality of "column driver IC 14") [figs. 1 and 3] for supplying data signals to the pixel electrodes; and

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a gray voltage generator (a combination of “*memory 32*”, “*decoder 33*”, and “*D/A converter 34*” included in a plurality of “*column driver IC 14*”) [figs. 1 and 3] coupled to the pixel electrodes, wherein the gray voltage generator generates gray voltages so that the data driver determines a particular data signal for a particular pixel electrode by using one of the gray voltages [par. (0037)], the gray voltage generator including a first gamma voltage register which stores digital gamma voltages received from the signal controller (“*memory 32*”) [fig. 3] [par. (0038) lines 1-2].

Park inherently teaches a common electrode and the liquid crystal layer being positioned between the pixel electrodes and the common electrode since it is required for any liquid crystal display to have a common electrode and to place the liquid crystal layer between the pixel electrodes and the common electrode, in order to control the liquid crystals of the layer by applying voltages between the pixel electrodes and the common electrode, and thus to display desired images based on the signals from the signal controller.

Park does not teach the gray voltage generator generating gray voltages that are each associated with a pixel color and the data driver determines a particular data signal for a particular pixel electrode by using one of the gray voltages that is associated with the pixel color of the particular pixel electrode.

However, Kudo teaches an apparatus for driving a liquid crystal display [par. (0002)] comprising a signal controller (a combination of “*MPU 906*”, “*system interface 907*”, and “*control register 301*”) [fig. 16] generating digital signals, gray scale voltage generator (“*302*”) coupled to the signal controller generating gray voltage signals that are specific to the different pixel colors [par. (0107) lines 1-4 and par. (0108) lines 6-10], and a data driver (“*decoder circuit 303*”) [figs. 3 or 9] selecting one of the gray voltage signals that is associated with the same pixel color as the digital signal [par. (0047) lines 6-8].

It would have been obvious to one of ordinary skill in the art at the time of the invention to apply the idea of Kudo, i.e. providing different digital gamma values for different pixel colors and generating different gray scale voltages based on the different digital gamma values, to the apparatus of Park, by

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modifying the signal controller of Park to include a plurality of registers, wherein each of the plurality of registers stores digital gamma values for each of a plurality of pixel colors, modifying the gray voltage generator of Park to generate gray voltage signals that are specific to each of the plurality of pixel colors by including additional memory, decoder, and D/A converter that are specific to each of the plurality of pixel colors, and modifying the data driver of Park to select one of the gray voltage signals which is associated with the same pixel color as the digital signal outputted from the signal controller, in order to allow the gray voltage generator of Park to output gray voltages representing more accurate gamma curves to the liquid crystal panel of the display of Park, and thus to improve the image quality of the display.

Park as modified by Kudo teaches a first color-specific gamma voltage register storing digital gamma voltages received from the signal controller for a specific pixel color, as discussed above.

Park as modified by Kudo does not teach a second color-specific gamma voltage register coupled to the first gamma voltage register, which stores digital gamma voltages received from the signal controller for a specified pixel color.

However, since the Applicants have failed to disclose having two color-specific gamma voltage registers instead of one color-specific gamma voltage register provides an advantage, is used for a particular purpose, or solves a state problem, it is an obvious matter of design choice to include two color-specific gamma voltage registers.

Furthermore, the courts have held that separating a single part (the color-specific gamma voltage register of Park as modified by Kudo) into a plurality of separated parts (the first and the second color-specific gamma voltage register) is generally recognized as being within the level of ordinary skill in the art. *In re Dulberg*, 289 F.2d 522, 523, 129 USPQ 348, 349 (CCPA 1961).

Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to use one or two of color-specific gamma voltage registers in order to store digital gamma

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voltages received from the signal controller since either one or two of color-specific gamma voltage registers would perform equally well at storing digital gamma voltages temporarily.

As to **claim 13**, all of the claim limitations have already been discussed with respect to the rejection of claim 2.

As to **claim 15**, all of the claim limitations have already been discussed with respect to the rejection of claim 4.

As to **claim 17**, all of the claim limitations have already been discussed with respect to the rejection of claims 1 and 6.

As to **claim 19**, all of the claim limitations have already been discussed with respect to the rejection of claim 8.

As to **claim 20**, all of the claim limitations have already been discussed with respect to the rejection of claim 10.

As to **claim 21**, all of the claim limitations have already been discussed with respect to the rejection of claim 9.

8. **Claims 7 and 18** are rejected under 35 U.S.C. 103(a) as being unpatentable over Park and Kudo as applied to claims 1, 2, 4, 6, 8-15, 17, and 19-21 above, and further in view of Kitajima et al. (US 5,091,722).

As to **claim 7**, Park as modified above teaches the sampling unit (Park: a combination of “*D/A converter 28*” and “*buffer 30*” included in a plurality of “*column driver IC 14*”) [Park: fig. 1] comprising a plurality of sampling circuits.

Park as modified above does not expressly teach the structure of the sampling circuit.

However, Kitajima [fig. 13] teaches a sampling circuit (“3”) included in a display apparatus, which comprises:

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a switch (“8”, “9”, and “10”) that turns on in response to a sampling signal from a signal controller;

a capacitor coupled to the switch for storing the sampled voltage data (“17”, “18”, and “19”); and

an analog buffer (“20”, “21”, and “22”) coupled to the capacitor for outputting the stored voltage data.

It would have been obvious to one of ordinary skill in the art at the time of the invention to specify the structure of the sampling circuit of Park as modified above to include a switch, a capacitor, and an analog buffer, as taught by Kitajima, in order to allow the display of Park as modified above to sample the image data signals .

As to **claim 18**, all of the claim limitations have already been discussed with respect to the rejection of claim 7.

Allowable Subject Matter

9. **Claims 5 and 16** are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Conclusion

10. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Seokyun Moon whose telephone number is (571) 272-5552. The examiner can normally be reached on Mon - Fri (8:30 a.m. - 5:00 p.m.).

If attempts to reach the examiner by telephone are unsuccessful, the examiner’s supervisor, Sumati Lefkowitz can be reached on (572) 272-3638. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

September 25, 2007

- s.m.

A handwritten signature in black ink, appearing to read "Sumati Lefkowitz", with a stylized flourish at the end.

SUMATI LEFKOWITZ
SUPERVISORY PATENT EXAMINER